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STRUCTURAL PECULIARITIES IN AN ABNORMAL QUEEN BEE.

BY J. A. NELSON, PH.D.

In May of the present year (1911) the Bureau of Entomology received through the kindness of The A. I. Root Company, Medina, Ohio, an abnormal queen bee, together with the cell from which she emerged. These had been originally sent to the company by the Rev. A. Francois, Parish Priest of Grand Bay, B. W. I. Father Francois also sent a letter containing the following data: The queen was hatched in 18 days after the colony became queenless, the cell being formed on drone comb. She was very active and Father Francois mistook her for a hermaphrodite, "half queen and half drone."

The queen when received was alive, and appeared to be in good condition. It was planned to introduce her into a colony to test her fertility, but she perished by an accident before this could be carried out. A careful examination of the exterior of the dead queen showed nothing abnormal or unusual in the structure of the head, thorax, or appendages. The abdomen, however, was of a very unusual shape. Instead of the long tapering conical form characteristic of the normal queen bee (fig. 1 D), it was in this case broadly ovate, as fig. 1 A and C show. Moreover, the three terminal segments were bent strongly ventrad, so that the outline of the abdomen suggests that of the drone, having a blunt apex, and doubtless was the cause of Father Francois' supposition that this bee was hermaphroditic. A more careful examination of the abdomen disclosed further abnormalities. In correlation with the unusual breadth of the abdomen, the sternites of the 5th and 6th segments are much broader than in the normal queen (fig. 1 C). They are, moreover, somewhat asymmetrical, as is also the sternite of the 4th segment, although to a slighter degree. Most modified of all is the sternite of the 7th segment. In the normal queen (fig. 1 D) this has approximately the outline of an isosceles triangle with a small notch at its caudal apex. In the abnormal queen (fig. 1 C) this plate is so much reduced by shortening in the longitudinal axis that it is almost completely covered and concealed by the sternite of the 6th segment.

This reduction of the 7th segment in part accounts for the strong downward flexure of the abdomen. In addition, the caudal notch is very wide and deep, with a semicircular outline, and extends over fully one-half of the posterior border of the segment. The sting is also slightly abnormal, having a kink about midway of its length.

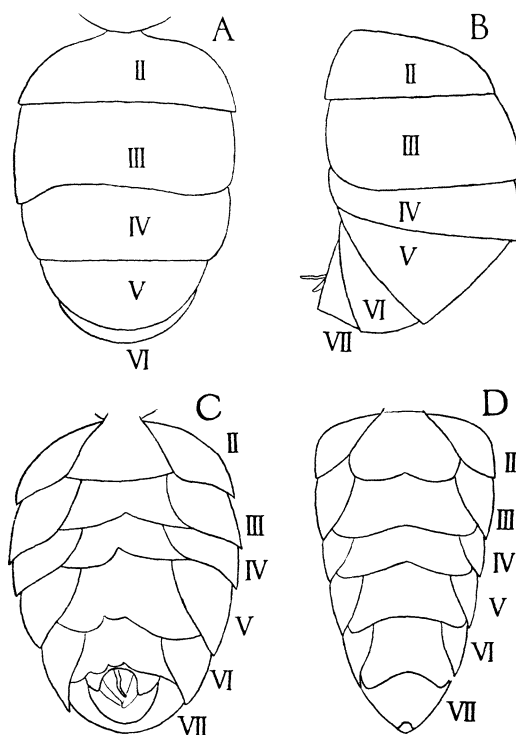


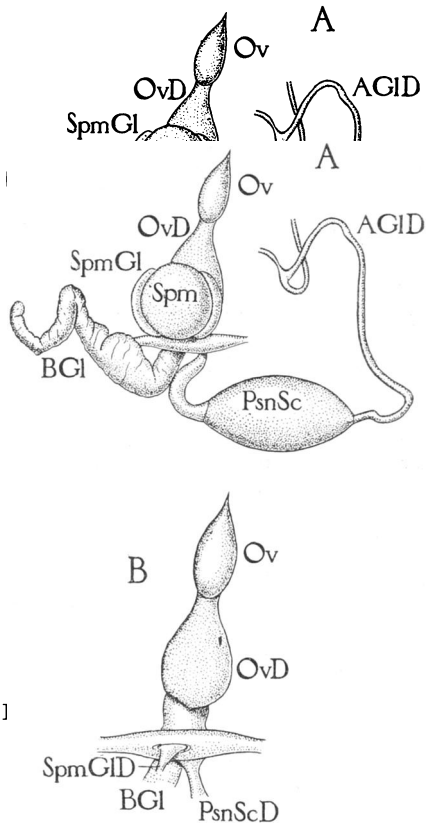
Fig. 1.—A, B, and C, dorsal, lateral, and ventral views of abdomen of abnormal queen. D, abdomen of normal queen, ventral view. $\times 5$.

An examination of the internal organs showed other and more fundamental peculiarities. The poison glands, poison sac and spermatheca (fig. 2 A) in their size and structure display no apparent abnormalities. The spermatheca was empty, indicating that the queen was a virgin. The digestive tract also seemed to be normal. The sex organs, however, were strikingly modified. The left ovary (fig. 2 A and B), together with its duct, was entirely wanting. The right oviduct (fig. 2 B, OvD) was present, but compressed in a dorso-ventral direction, and bent in the sagittal plane into a sigmoid curve.

Attached to its upper end was a fusiform opaque whitish mass (Ov) 1.8 mm. in length, apparently representing a single egg tube, and seemingly containing only a single egg.

As fig. 2 A and B show, the external openings of the poison apparatus on the one hand and the spermatheca and vagina on the other are very close together. In the normal queen this is not the case since they are separated by a considerable interval, which is taken up by the dorsal wall of the bursa copulatrix. It is evident, therefore, in the case under consideration, that the bursa is very much shortened in an antero-posterior direction, in correlation with the shortening of the sternite of the 7th abdominal segment.

The cause of the abnormalities recorded here is entirely unknown. The cell from which this queen emerged was to all appearances entirely normal. Moreover, these abnormalities cannot be related to the sexual characters of the drone or the worker, except in so far as the reduction of the ovaries



poison sac. PsnScD, duct of same.
Spm, spermatheca. SpmGID, duct of same.

is peculiar to the worker, but in the latter case they are symmetrical. The queen is not in any way hermaphroditic, but merely abnormal in the reduction of certain parts of the abdominal wall and viscera.